

III. REMARKS

A. Amendments to the Claims

Claim 29 has been amended to recite a grafted copolymer comprising polysaccharide modified to have at least one unsaturated compound containing function group chemically bound to said polysaccharide, said grafted polymer being dispersible in water and having a molecular weight lower than the molecular weight of said polysaccharide prior to said modification.

Claims 30–37, all of which are dependent directly or indirectly upon claim 29, have been amended to recite the term “grafted polymer.”

Support for the amendment to claim 29 is set forth, in particular, in Paragraphs [009] , [010] and [029], as well as in [015] and [035].

Claim 38 has been canceled.

B. Rejection Under 35 U.S.C. § 112, Second Paragraph

Claim 33 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Applicants have amended claim 33 to incorporate the change proposed by the Examiner to set forth proper Markush terminology.

C. Rejections Under 35 U.S.C. § 112, First Paragraph

Claims 29–38 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

1. The Examiner's reasons in support of the rejection

The Examiner's reasons in support of the rejection are as follows:

The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Claims 29–37 have been amended to claims directed to a graft copolymer of a polysaccharide. Although the specification discloses unsaturated monomers being grafted onto polysaccharides, the specification does not describe the compound or composition as “graft copolymers.” This lack of claimed terminology in

the instant specification fails to comply with the written description requirement of 35 U.S.C. 112, first paragraph. Hence, the claims set forth "new matter," which is improper under 35 U.S.C. 112, first paragraph.

It is also noted that the instant specification does not support the subject matter of Claim 38, which is drawn to a composition comprising (1) a graft copolymer of a polysaccharide having a molecular weight lower than 700,000 Daltons and (2) an ungrafted polysaccharide having a molecular weight more than 2,000,000 Daltons, which is also improper [under] 35 U.S.C. 112, first paragraph. Accordingly, the composition of claim 38 set[s] forth "new matter."

(Examiner's Action, page 3, lines 7–23).

2. Applicants' response to the rejection

Claims 29–37 have been amended to change the term "graft copolymer" to "grafted polymer." In the claims "grafted" is being used as an adjective to modify the noun "polymer" by limiting, qualifying or specifying the polymer. The remaining amendments to claim 29 are believed to be supported by the specification, in particular, at Paragraphs [009], [010] and [029] and are intended to define the grafted polymer in terms of what the polymer comprises and in terms of its physical properties and characteristics relative to water and to one of the starting materials of the polymer, an unmodified polysaccharide. Claim 38 has been canceled.

Accordingly, in view of the above amendments to claims 29–37 and the cancellation of claim 38, the rejection of claims 29–38 under 35 U.S.C. § 112 should be withdrawn.

D. Rejections Under 35 U.S.C. § 102

The Examiner has raised the following three rejections under 35 U.S.C. § 102(b).

- (1) Claims 29–34 stand rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 3,522,158 to Garrett et al. ("Garrett et al.") for the reasons set forth on page 3 of the Office Action mailed February 23, 2005.
- (2) Claims 29, 35 and 36 stand rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 3,461,052 to Restaino et al. ("Restaino et al.") for the reasons disclosed on pages 3 and 4 of the Office Action mailed February 23, 2005.
- (3) Claims 29 and 37 stand rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 4,831,097 to Chuang et al.

("Chuang et al.") for the reasons disclosed on pages 3 and 4 of the Action mailed February 23, 2005.

1. Position of the Examiner

These rejections are being addressed together because the Examiner's comments set forth in the Action are essentially the same for each of the rejections. The Examiner's comments are as follows:

Applicants' arguments filed January 18, 2006, have been fully considered but they are not persuasive. Applicants argue that the rejection of the claims as [being] anticipated by the... [referenced] patent should be withdrawn because the . . . [referenced] patent does not disclose a grafted polysaccharide that has a molecular weight lower than the molecular weight of the ungrafted polysaccharide. This argument is not persuasive since the text in Claim 29, the independent claim, which recites "the grafted polysaccharide having a molecular weight lower than the molecular weight of the ungrafted polysaccharide" is based on a process limitation. Applicants are reminded that process limitations cannot impart patentability to a product that is not patentably distinguished over the prior art. *In re Thorpe et al.* (CAFC 1985), supra [no citation] *In re Dike* (CCPA 1968) 394 F2d 584, 157 USPQ 581; *Tri-Wall Containers, Inc. v. United States et al.* (Ct Cls 1969) 408 F2d 748, 161 USPQ 116; *In re Brown et al.* (CCPA 1972) 450 F2d 531, 173 USPQ 685; *Ex parte Edwards et al.* (BPAI 1986) 231 USPQ 981. Accordingly, the rejection of Claims . . . under 35 U.S.C. 102(b) as being anticipated by . . . [the referenced] patent is maintained for the reasons of record.

(Examiner's Action, Paragraphs 10, 12 and 14 on pages 4–6).

2. Applicants' Response to the Examiner's Comments

The Examiner's position relative to Applicants' prior arguments for patentability of these claims is based on the following: (1) Applicants' argument is not persuasive since the text in claim 29, the independent claim, which recites "the grafted polysaccharide having a molecular weight lower than the molecular weight of the ungrafted polysaccharide" is based on a process limitation; (2) Applicants are reminded that process limitations cannot impart patentability to a product that is not patentably distinguished over the prior art.

In response to the Examiner's position that process limitations must impart patentability to a patent, Applicants have amended claim 29 to remove all process limitations. With respect to the claim terminology "grafted polymer," the word "grafted" is used as an adjective, *i.e.*, to modify the noun "polymer," by limiting, qualifying or specifying the polymer. If the Examiner

believes that claim 29 still contains process limitations that prevent allowance of claims 29–37, or consideration of product limitations in the claim, the Examiner is respectfully requested to identify the process limitations at issue.

Applicants also note that the claim term “the grafted polymer comprising polysaccharide modified to have at least one unsaturated compound containing function group chemically bound to said polysaccharide . . . and having a molecular weight lower than the molecular weight of said polysaccharide prior to said modification” is a limitation of physical characteristics of the grafted polymer and not a process limitation. Applicants assume that the Examiner accepts Applicants’ position that the quoted passage represents a physical limitation. This assumption is based on the following statement in the Action:

This argument is not persuasive since the text in claim 29, the independent claim, which recites “the grafted polysaccharide having a molecular weight lower than the molecular weight of the ungrafted polysaccharide” **is based on a process limitation.** (*emphasis added*). In other words, the quoted limitation is not in itself a process limitation.

(Examiner’s Office Action at page 4, lines 11-14).

Although claim 29 is believed to have no process limitations, Applicants contend that a limitation as to the physical properties of the grafted polymer should be given consideration as a physical limitation even if the claim also contains a process limitation. In other words, the molecular weight limitations should be considered, in any event, as they are limitations that distinguish the subject matter of claim 29 over the prior art cited in the rejection of this claim under 35 U.S.C. § 102(b).

As discussed below in more detail, claims 29–36 are not anticipated by any of the references cited by the Examiner because none of the references discloses grafted polymer comprising polysaccharide modified to have at least one unsaturated compound containing functional group chemically bound to said polysaccharide, said grafted polymer being dispersible in water and having a molecular weight lower than the molecular weight of said polysaccharide prior to said modification.

Under Section 2131.01 of the Manual of Patent Examining Procedure,

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 632, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

For the reasons set forth above and herebelow, none of the prior art relied on by the Examiner for the rejections under 35 U.S.C. § 102(b) either expressly or inherently describes each and every element set forth in claim 29 and in claims 30–37, which depend directly or indirectly upon claim 29.

**3. Reasons for Rejections Under 35 U.S.C. § 102(a)
set forth in Examiner's Action Mailed February 23, 2005,
and Applicants' Response**

As noted above, in this Action, the Examiner has relied on the reasons for rejection of the claims under 35 U.S.C. § 102(b) set forth in the Action mailed February 23, 2005. These reasons and Applicants' responses are set forth below.

**(a) Response to rejection of claims 29–34 under 35 U.S.C.
§ 102(b) as anticipated by U.S. Patent No. 3,522,158
to Garnett et al.**

The Examiner's reasons in support of this rejection are as follows:

Applicants claim a polysaccharide grafted with an unsaturated monomer, said grafted polysaccharide being dispersible in water. Additional limitations in the dependent claims include specific unsaturated monomers and specific polysaccharides.

The Garnett et al. patent discloses graft polymers which preparation involves a hydrophilic backbone polymer being irradiated in the presence of a solution of a monomeric vinyl compound (see abstract). See column 1, lines 41–46 of the Garnett et al. patent wherein the backbone polymers include cellulose, any of its derivatives such as the aliphatic ethers and esters of cellulose which are hydrophilic. See column 2, 2nd paragraph of the Garnett et al. patent wherein examples of the monomeric vinyl compound are set forth which include styrene, methylmethacrylate, acrylonitrile, acrylamide, vinyl pyridines, vinyl carboxylic acids, and many others. The grafted polymers of the Garnett et al. patent anticipate the instantly claimed grafted polysaccharide when the polysaccharide is modified cellulose.

(Examiner's Office Action of February 23, 2005, page 3).

Claims 30–34 are dependent upon claim 29, or upon a claim ultimately dependent upon claim 29. Claim 29 is now directed to a grafted polymer comprising a polysaccharide modified to have at least one unsaturated compound containing functional group chemically bound to

said polysaccharide, said grafted polymer being dispersible in water and having a molecular weight lower than the molecular weight of the polysaccharide prior to said modification.

The Garnett et al. patent discloses grafting onto a backbone polymer such as cellulose any monomeric vinyl compound which can be polymerized by free radical or ionic mechanisms (Abstract and column 1, line 41 to column 2, line 11). The grafted polymer, which comprises both a cellulose [*i.e.*, polysaccharide] backbone and monomeric vinyl compound will have a molecular weight greater than the ungrafted cellulose [*i.e.*, polysaccharide]. Accordingly, as the grafted polysaccharide disclosed in the Garnett et al. patent does not have a molecular weight lower than the molecular weight of the ungrafted polysaccharide, a rejection of claim 29 under 35 U.S.C. § 102(b) as being anticipated by the Garnett et al. patent is untenable and should be withdrawn. As claims 30–34 are dependent upon claim 29, or upon a claim ultimately dependent upon claim 29, a rejection of claims 30–34 under 35 U.S.C. § 102(b) as anticipated by the Garnett et al. patent is also untenable and should be withdrawn.

**(b) Response to rejection of Claims 29, 35 and 36
under 35 U.S.C. § 102(b) as anticipated by
United States Patent No. 3,461,052 to Restaino et al.**

The Examiner's reasons in support of this rejection are as follows:

Applicants claim a polysaccharide grafted with an unsaturated monomer, said grafted polysaccharide being dispersible in water. Additional limitations in the dependent claims include specific unsaturated monomers and specific polysaccharides.

The Restaino et al. patent discloses graft copolymers wherein vinyl monomers are grafted onto hydrophilic polymeric substrates. See column 2, 1st paragraph wherein suitable substrates materials are listed, which include cellulose, wool, starch, alginic acid and the alginates, vegetable gums such, for example, as locust bean gum, guar flour, or gum tragacanth, gelatin, casein, pectin, polyvinyl alcohol, hydrophile high molecular weight polyalkylene glycols, and the like. Suitable vinyl monomers are listed in the 2nd paragraph of column 2, which include vinyl acetate, acrylic acid and its esters, methacrylic acid and its esters, acrylamide, acrylonitrile, styrene, vinyl toluene, vinyl pyridine, alkyl vinyl pyridines, divinyl benzene, butadiene, N,N-methylene bis-acrylamide, and the like. The grafted copolymers of the Restaino et al. patent anticipate the instantly claimed grafted polysaccharide when the polysaccharide is guar, cationic guar, nonionic guar, locust bean gum, xanthan gum and amylose.

(Examiner's Office Action of February 23, 2005, pages 3–4).

Claims 35 and 36 are dependent upon claim 29, the subject matter of which is described above in Applicants' response to the rejection under 35 U.S.C. § 102(b) as anticipated by the Garnett et al. patent. The Restaino et al. patent is directed to grafting by radiation vinyl monomers to hydrophilic polymeric substrates such as cellulose. As the Restaino et al. process grafts the vinyl polymer onto the cellulose [*i.e.*, the polysaccharide], the grafted polysaccharide is intended to have a molecular weight higher than the ungrafted cellulose [polysaccharide].

The only statement in Restaino et al. about depolymerization is at column 3, lines 4–13 and relates to the [hydrophilic polymeric] cellulose substrate. Column 3, lines 4–13 read as follows:

Higher radiation doses, up to and even exceeding 10^8 roentgens may be employed. Obviously, if the substrate undergoes depolymerization or degradation under the effect of radiation and it is desired to retain the polymeric structure of the substrate the dose must be correspondingly limited. Thus, when grafting onto cellulose, excessive degradation is avoided by keeping the radiation dose below about 10^6 roentgens. Useful graft copolymers of cellulose degradation products may, however, be obtained by employing higher radiation doses.

As there is no disclosure that the products are dispersible in water, a rejection of claim 29 under 35 U.S.C. § 102(b) as anticipated by the Restaino et al. patent is not fully supported and should be withdrawn. As claims 35 and 36 are dependent upon claim 29, a rejection of claims 35 and 36 under 35 U.S.C. § 102(b) as anticipated by the Restaino et al. patent should be withdrawn for the same reason.

**(c) Response to rejection of Claims 29 and 37
Under 35 U.S.C. § 102(b) as anticipated by
United States Patent No. 4,831,097 to Chuang et al.**

The Examiner's reasons in support of this rejection are as follows:

Applicants claim a cosmetic composition comprising a grafted polysaccharide [polysaccharide].

The Chuang et al. patent discloses a graft polymer that comprises on which is grafted a [quaternized] amino lactam, which was prepared by reacting a N-halomethyl lactam with a vinyl or acrylic compound having terminal tertiary amino groups. Chuang et al. discloses that the graft polymer is used in cosmetics (see Derwent Abstract), which anticipate[s] the instantly claimed cosmetic composition.

(Examiner's Office Action of February 23, 2005, page 4).

Claim 37 is dependent upon claim 29. Claim 29 has been described in connection with the rejection under 35 U.S.C. § 102(b) as anticipated by the Garnett et al. patent.

Like the Garnett et al. patent, the Chuang et al. patent discloses the formation of a grafted polysaccharide having a molecular weight higher than the molecular weight of the ungrafted polysaccharide. More specifically, the Chuang et al. patent discloses a grafted polymer formed from the residue of a cellulosic polymer on which is grafted a cationic quaternized comonomer. The Chuang et al. process results in the production of a cellulose copolymer wherein the hydrogen atom of a hydroxy group of the hydroxylated cellulose is replaced with the quaternized amino lactam group. (See column 5, lines 16–19). Accordingly, as the molecular weight of the grafted polymer is necessarily higher than the molecular weight of the ungrafted polymer, the rejection of claims 29 and 37 under 35 U.S.C. § 102(b) as anticipated by the Chuang et al. patent is untenable and should be withdrawn.

E. Rejection Under 35 U.S.C. § 103

Claims 21–28 and 38 are rejected under 35 U.S.C. § 103(a) as being unpatentable over United States Patent No. 3,461,052 to Restaino et al., in view of United States Patent No. 5,223,171 to Jost et al.

1. Examiner's reasons in support of the rejection

In support of the rejection, the Examiner relies on Restaino et al. as disclosing “a process for the production of graft substrates by ionizing radiation, wherein a hydrophilic polymeric substrate is irradiated in the presence of a solution of a monomeric vinyl compound.” The Restaino et al. patent is also relied on as teaching using radiation to produce graft copolymers, wherein the radiation may also be used to depolymerize the polymers.

Jost et al. is described as disclosing a detergent composition containing biodegradable graft polysaccharide, in which the graft polysaccharide consists essentially of a polydextrose having an average-weight molecular mass of less than 10,000. The average-weight molecular mass of less than 10,000 disclosed in the Jost et al. patent is noted as falling within the

requirement of the instant claims that the polysaccharide in the copolymer has a molecular weight of no more than 700,000 Daltons. The Examiner concludes:

One having ordinary skill in the art would have been motivated to employ the process of the prior art with the expectation of obtaining the desired product because the skilled artisan would have expected the analogous starting materials to react similarly.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the polysaccharide of the graft copolymers produced in the process using radiation for depolymerization of polysaccharide of the Restaino et al. patent with polysaccharide having a molecular weight of not more than 700,000 Daltons in view of the recognition in the art as evidenced by the Jost et al. patent that polysaccharide having an average molecular mass of less than 10,000 allows for the preparation of a product which is biodegradable.

(Examiner's Office Action, page 7, lines 20-30).

**2. Comparison of Applicants' claimed invention
to the combined disclosure of the prior art**

Applicants' method as claimed in claim 21 (and in claims 22–28, which are dependent upon claim 21) is directed to a method for grafting an unsaturated monomer onto a polysaccharide, which includes an irradiating step (2), wherein the graft polymer is depolymerized to a molecular weight lower than the molecular weight of the ungrafted polysaccharide. In other words, Applicants' claimed method comprises depolymerization of the graft polymer *not* biodegradation. As is acknowledged by the Examiner, the Jost product is biodegradable. In depolymerization, the polymer continues to exist. However, biodegradation of the product means that the product no longer exists, but is broken down into different compounds such as carbon and water. Accordingly, the disclosure in Jost et al. of the preparation of a product which is biodegradable in fact teaches away from Applicants' claimed method of preparing a graft polymer that is depolymerized. Restaino et al. disclose that a substrate when exposed to higher radiation doses may undergo depolymerization or degradation under the effects of radiation, and as it is desired to retain the polymeric structure of the substrate, the dose must be correspondingly limited. (Col. 3, lines 4–8). Thus, one combining the teaching of Jost et al. with the teaching of Restaino et al. would be led by Jost

et al. to use radiation to produce a product that is biodegradable, *i.e.*, degraded, and not a product that is depolymerized.

According to the Manual of Patent Examining Procedure, Section 2143:

The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte Clapp*, 227 USPQ 272, 973 (Bd. Pat. App. & Inter. 1985).

As noted above, Restaino et al. and Jost et al. do not expressly or impliedly suggest the desirability of the claimed invention or render obvious the claimed invention to one of ordinary skill in the art.

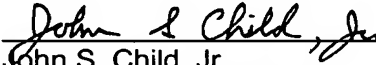
Accordingly, for the reasons set forth above, the rejection of claims 21–28 and 38 under 35 U.S.C. § 103(a) as being unpatentable over Restaino et al. in view of Jost et al. is untenable and should be withdrawn.

IV. Conclusion

It is believed that the above Amendment and Remarks constitute a complete response under 37 CFR § 1.111 and that all bases of rejection in the Examiner's Action have been adequately rebutted or overcome. A Notice of Allowance in the next Office Action is, therefore, respectfully requested. The Examiner is requested to telephone the undersigned attorney if any matter that can be expected to be resolved in a telephone interview is believed to impede the allowance of pending claims 21–37 of United States Patent Application Serial No. 10/607,079.

Respectfully submitted,

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